

SUMMARY REPORT ON PORTLAND CANAL
JUVENILE CHUM SALMON OUT-MIGRANT SURVEY TRIP, MAY 17-23, 1987

U.S./CANADA RESEARCH PROJECT

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Regional Information Report¹ No. 1J87-05

Alaska Department of Fish and Game
Division of Commercial Fisheries
Ketchikan, Alaska

October 1987

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Introduction

Annex IV, Chapter 2 of the Pacific Salmon Treaty identifies specific concerns by both Alaska and Canada for chum salmon originating in Portland Canal tributaries. During, the last few years a dramatic increase in development on the Bear River estuary in upper Portland Canal by Canadian logging and coal transfer interest has raised major concerns on the impact of these activities on juvenile salmonids, crustaceans (crab and shrimp), and other pelagic fish species occurring in this area. Several reports have been prepared on the development activities in this area and Williams (1986) contract report for the Canadian Department of Fisheries and Oceans summarizes the latest details on these activities in this area and their potential impact on several fish species and other benefic organisms. The increased pace of development that occurred in 1986 and proposed increases in 1987 and beyond, has again brought these activities to the attention of Pacific Salmon Commission (PSC). A one week joint research and monitoring trip to this area by the Alaska Department of Fish and Game, National Marine Fisheries Service, and Canadian Department of Fisheries and Oceans personnel was conducted to collect information on this area for PSC members review and potential action during the week of May 17-23, 1987.

Objectives

1. Collect additional data on the utilization of the Bear and Salmon River estuaries by juvenile salmonids, crustaceans, and other pelagic fish. Particular emphasis was placed on defining juvenile chum salmon areas of concentration in these two estuaries.
2. Identify utilization of either the Salmon or Bear River estuaries by coded wire tagged (CWT) juvenile chum salmon released in Fish Creek, a major chum salmon tributary to the Salmon River.
3. Collect additional data on the utilization of log dump areas (legal and illegal) by juvenile salmonids and other pelagic fish in the Salmon and Bear River estuaries.
4. Collect data on the effects of the coal transfer site on upper Portland Canal crustaceans (Tanner and Dungeness crab).

Methods

A joint research team consisting of staff from the Alaska Department of Fish and Game, the National Marine Fisheries Service, and the Canadian Department of Fisheries and Oceans gathered in Hyder, Alaska and Stewart, British Columbia during the week of May 17-23 to conduct sampling on the Bear and Salmon River tidal flats. Logistics support for the sampling crew was provided by the Alaska Department of Fish and Game R.V. Steller along with a 17' skiff provided by the Alaska Department of Fish and Game and a 14' rubber raft provided by the Canadian Department of Fisheries and Oceans. Sampling gear utilized by the five man team consisted of one 125' beach seine, (1/2" to 3/16" mesh), one 50' beach seine (1/4" mesh with 1/8" mesh bunt), one 18" x 30" fyke net (1/8" mesh), and two long handled dip nets (1/8" mesh).

Sampling methodology consisted of setting the beach seines and/or fyke net during incoming or outgoing tides on both the Bear and Salmon River tidal flats at a number of study sites established during this activity. The actual study sites sampled are illustrated on Figures 1-4. In addition, the research team identified a number of locations where at low tide, fish could be sampled with long handled dip nets (Fig. 3). During each days activities all fish captured were identified, enumerated, and all salmonids were examined for adipose fin clips which indicate the presence of a coded wire tag.

Finally, two dungeness crab pots were set each day in 40 to 100' of water in the vicinity of the coal transfer station (Fig. 1-3). Each pot was picked approximately every 24 hours and all catches were identified, examined for coal dust accumulation, photographed, and then released.

Results

During the operation of this program a total of 65 beach seine sets were completed on the tidal flats of the Bear and Salmon Rivers. In addition, three 12-24 hour fyke net sets were completed along with one day of dip net collection (Figs 2-3). The cumulative catch for the beach seine sets consisted of 872 juvenile chum salmon, 1,087 juvenile coho salmon (812 smolts, 275 fry), 1 sockeye salmon fry, 188 Dolly Varden, 1,823 3-spine stickelback, 123 starry flounder, 8 staghorn sculpins, 5 Pacific herring, 3 capelin, 1 eulachon, and 1 snake prickelback (Table 1).

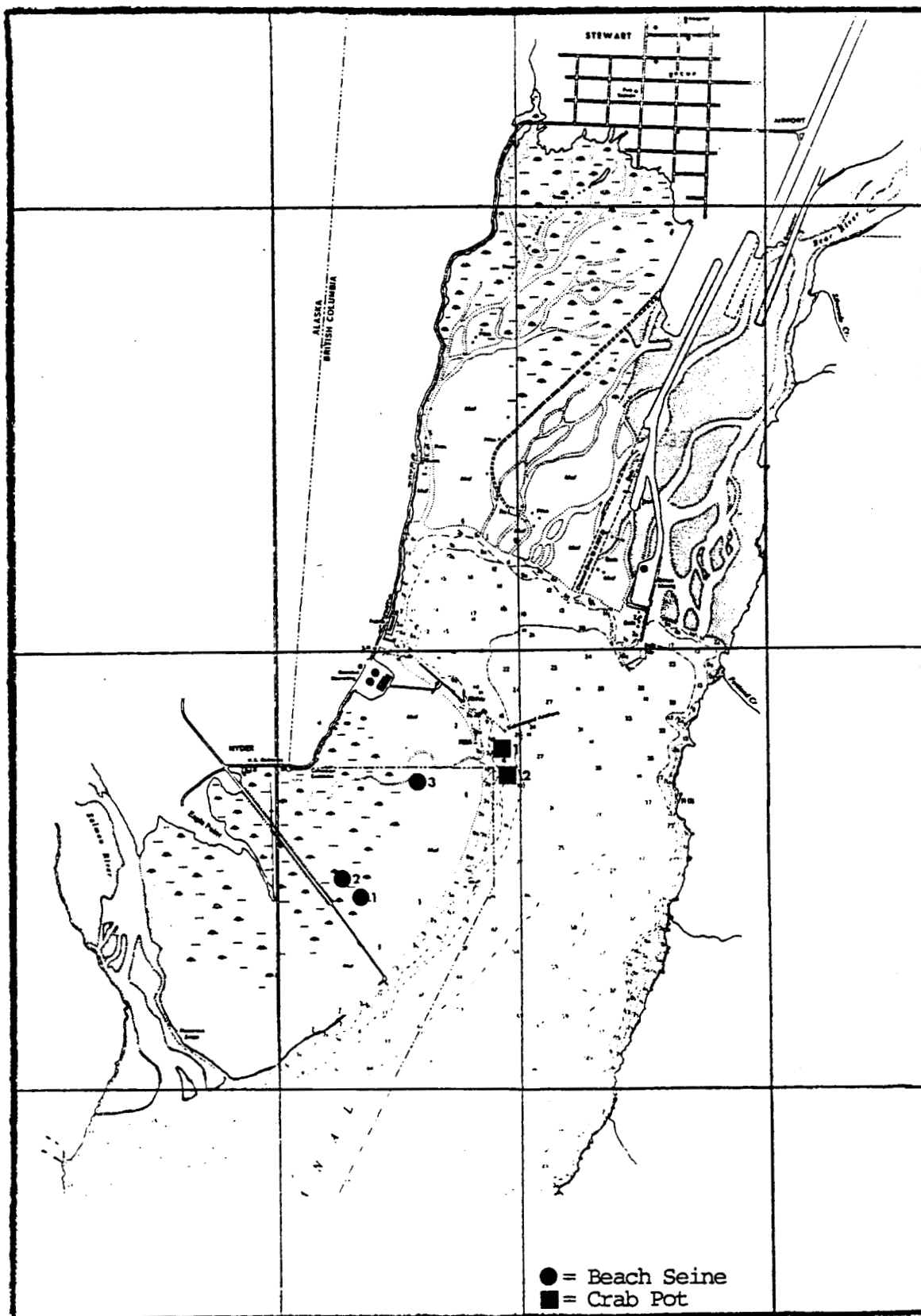


Figure 1. Beach seine and crab pot sampling locations upper Portland Canal May 19, 1987.

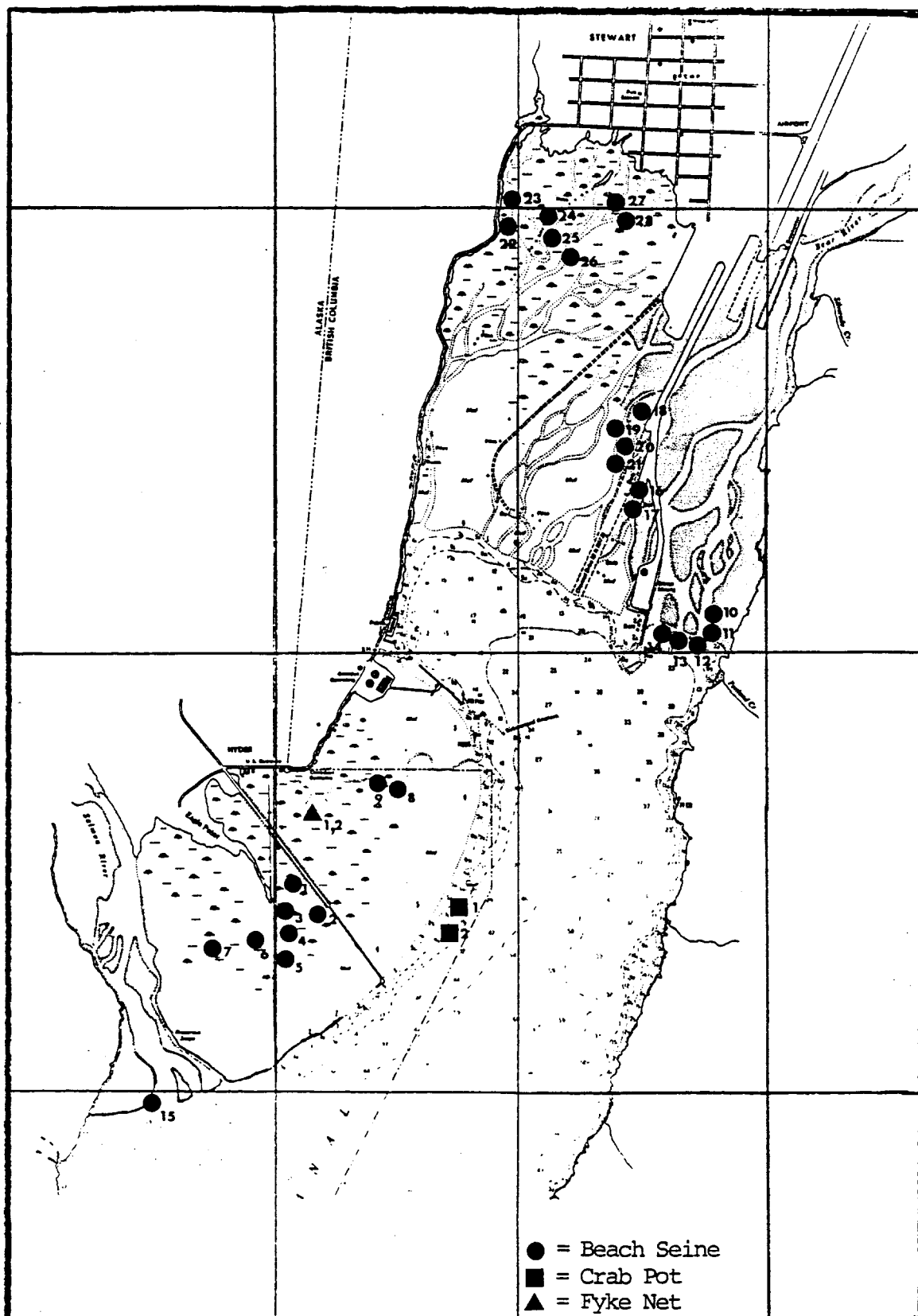


Figure 2. Beach seine, fyke net and crab pot sampling locations upper Portland Canal May 20, 1987.

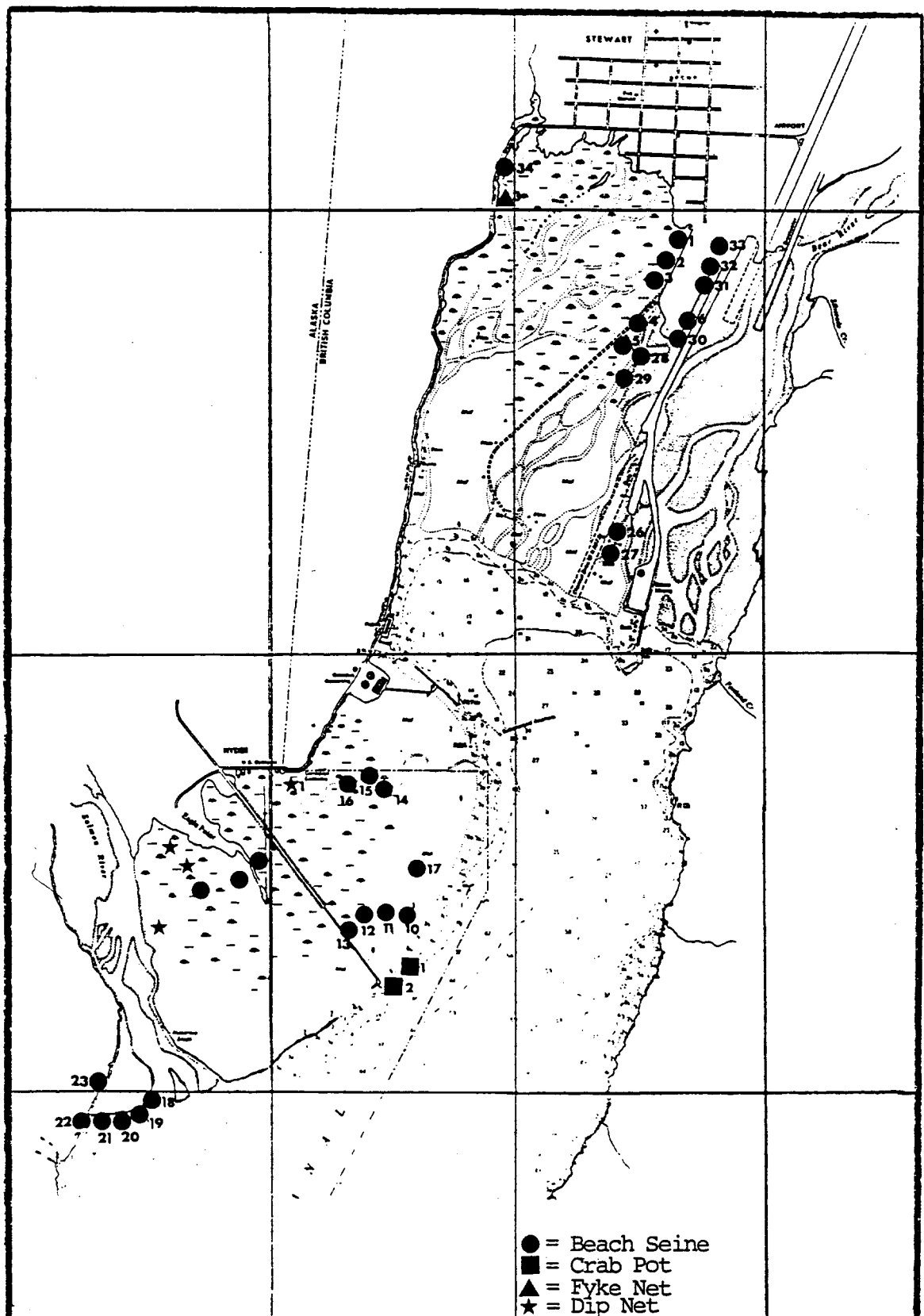


Figure 3. Beach seine, fyke net, dip net and crab pot sampling locations May 21, 1987.

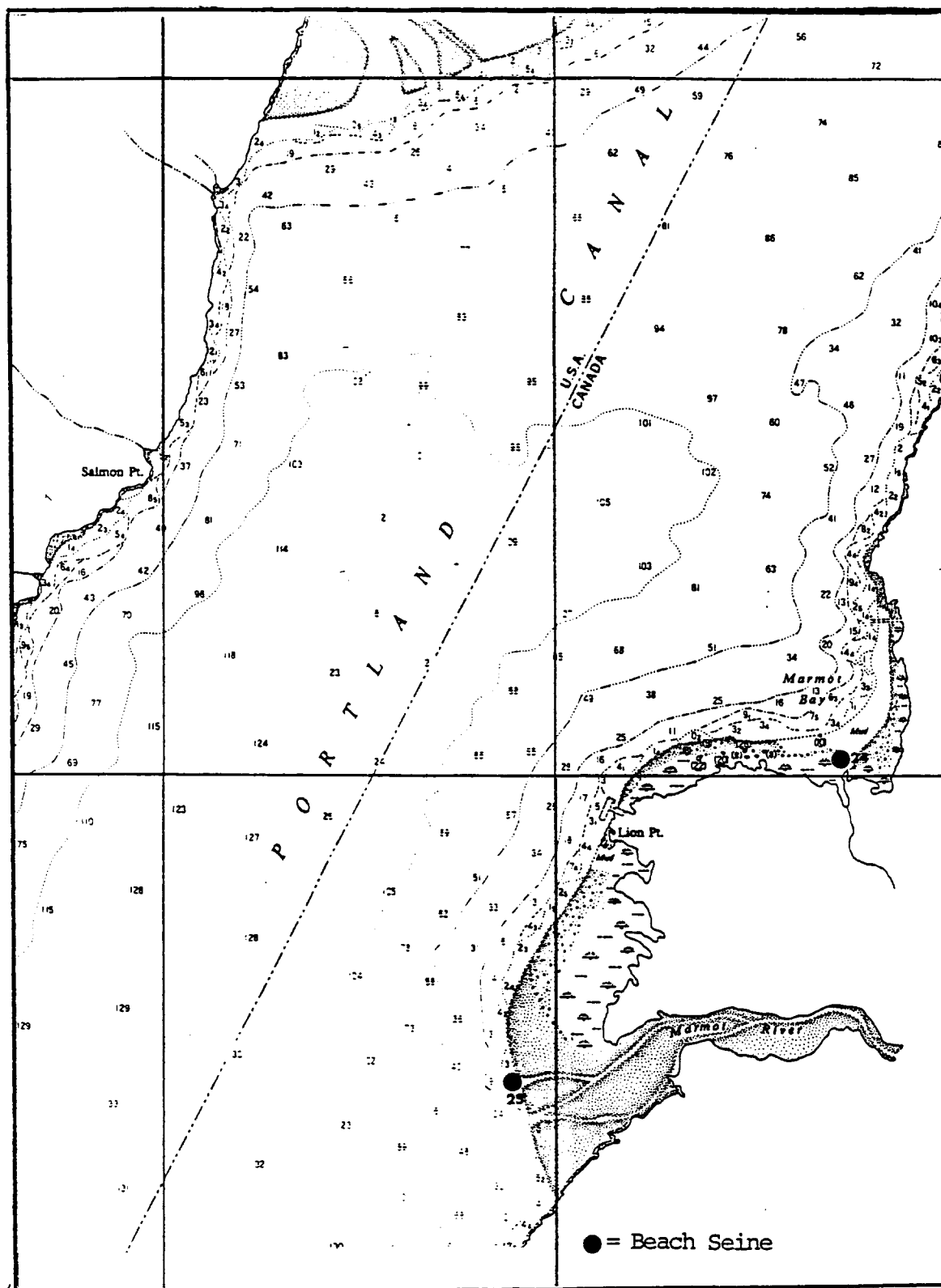


Figure 4. Beach seine sampling locations marmot Bay upper Portland Canal May 21, 1987.

Table 1. Summary of the Portland Canal beach seine sets on the intertidal areas of the Salmon and Bear Rivers, May 19-21, 1987

Set Number	Date	Area	Chum	Pink	Coho Smolt	Coho Fry	Dolly Varden	Stickleback	Other	Comments
1	5-19-87	East end of floatplane dyke	-	-	66	-	1	318		Heavy emergent vegetation
2		East end of floatplane dyke	1	-	17 ^{1/}	-	4	70	1 herring 1 snake prickleback	
3		Hyder Creek mouth	-	-	-	-	-	6	1 herring 1 starry flounder	Incomplete set hung net
1	5-20-87	West end of floatplane dyke	-	-	5	-	-	6		
2		West end of floatplane dyke	-	-	45	-	10	79		
3		Mouth of unauthorized log storage	1	-	-	-	2	-		Gravel bottom no vegetation
4		Mouth of unauthorized log storage	-	-	-	-	2	3		Gravel bottom no vegetation
5		Deep channel westside of log storage	-	-	-	-	-	-	Water haul	Too deep for net
6		300' upstream from set # 5	-	-	1	-	2	6		Site lacks emergent vegetation
7		2nd channel west of log storage	-	-	-	-	1	3	3 starry flounder	No vegetation
8		Hyder Creek mouth	-	-	2	-	1	10	2 herring 2 starry flounder	Emergent vegetation on site but not in middle of channel
9		200' upstream Hyder Creek	-	-	-	-	-	3	6 starry flounder	No emergent vegetation
10		Bear River mouth	-	-	-	-	9	-	5 starry flounder	No emergent vegetation
11		Bear River mouth	-	-	-	-	1	-	42 starry flounder	Sandbar substrate

Table 1. Continued

Set Number	Date	Area	Chum	Pink	Coho Smolt	Coho Fry	Dolly Varden	Stickleback	Other	Comments
12		Bear River mouth main channel	-	-	-	-	-	-	1 staghorn sculpin	Gravel substrate strong current net collapsed
13		Bear River mouth backwater eddy	1	-	-	-	-	1	19 starry flounder	Gravel and sand substrate
14		Bear River mouth Backwater eddy	-	-	-	-	-	-	13 starry flounder 1 staghorn sculpin	Gravel and sand substrate
15		Mouth of main channel Salmon River	-	-	-	-	38	-		Gravel substrate no vegetation
16		Bear River along Causeway	1	-	-	-	-	-	1 eulachon	Gravel substrate some vegetation
17		Bear River along Causeway	-	-	-	-	-	-	1 starry flounder 2 staghorn sculpin	
18		Bear River along Causeway	$\frac{2}{9}$	-	-	-	-	-	1 starry flounder	
19		Bear River along Causeway	-	-	4	-	-	-		
20		Bear River along Causeway	$\frac{3}{6}$	-	1	-	2	2	4 starry flounder	
21		Bear River along Causeway	-	-	2	-	17	-	2 starry flounder	
22		Rainy Creek channel near highway	$\frac{4}{158}$	-	8	$\frac{5}{30}$	-	-	1 sockeye smolt	Gravel bottom-clearwater defined with emergent vegetation 11C
23		Rainy Creek Channel near highway	9	-	-	122	-	1		
24		Rainy Creek high water channel	6	-	8	4	4	-		In emergent vegetation
25		Downstream from # 24 on flooding tide	4	-	8	5	3	1		

Table 1. Continued

Set Number	Date	Area	Chum.	Pink	Coho Smolt	Coho Fry	Dolly Varden	Stickleback	Other	Comments
26		Laundromat Creek	88	-	2	1	-	-		Emergent vegetation with gravel bottom
27		Laundromat Creek	19	-	-	-	-	-		Net hung up on snag
28		3rd channel over from road	285	-	10	33		371		Gravel bottom 9C
1	5-21-87	Bear River upper causeway	8	-	-	-	-	-		Bark and woody debris on bottom of pool
2		Pool near Bonlie sawmill site	-	-	-	-	-	11		Water shallow clear with snags
3		Similar site downstream	-	-	-	-	-	-	water haul	Emergent vegetation
4		Downstream from Bonlie site	-	-	2	-	-	-		Snagged up
5		Adjacent to # 4	1	-	1	-	-	-		
6		Bonlie Slough	-	-	-	-	1	-		Water too deep for short seine
7		Unauthorized Hyder log storage	15	-	-	-	-			Gravel bottom
8		Opposite side from # 7	6/5	-	-	-	1	-		
9		Channel SW of Hyder log storage	-	-	1	-	6	1	7 starry flounder	
10		N. end of Floatplane Road	-	-	3	-	-	36		
11		N. end of Floatplane RoadH	-	-	5	-	1	15		
12		N. end of Floatplane Road	-	-	218	-	5	32	3 capeline	
13		N. end of Floatplane Road	-	-	1	-	-	7		

Table 1. Continued

Set Number	Date	Area	Chum	Pink	Coho Smolt	Coho Fry	Dolly Varden	Stickleback	Other	Comments
14		Mouth of Hyder Creek	1	-	6	-	2	4	1 herring	
15		Hyder Creek 100 yds upstream	-	-	2	-	12			
16		Mouth of Hyder Creek	2	-	1	-	-	4		
17		Between Hyder Creek and Floatplane Road	-	-	1	-	3	6		
18		Mouth of Salmon River	1	-	-	-	39	-		Gravel substrate in eddy behind swift current
19		200' downstream of # 19	-	-	-	-	7	-		No vegetation
20		Salmon River side channel	13	-	-	-	-	-	2 sculpins	
21		Salmon River side channel	3	-	-	-	-	-		
22		West side of mouth of Salmon River	-	-	1	-	3	2		Gravel and rock substrate net hung up
23		Cliff next to Salmon River Slough	169	-	13	-	-	1		Mud bottom net hung up
24		Marmot cove log storage area	2	-	376	-	1	798		
25		Mouth of Marmot River	-	-	-	-	7	-		Deep set gravel bottom
26		Bear River causeway bridge	-	-	-	-	-	-	Water haul	
27		Bear River causeway bridge	-	-	-	-	-	-	1 staghorn sculpin	
28		End of Bonlie Sawmill	2	-	-	-	1	3		Gravel bottom no vegetation
29		End of Bonlie Sawmill	-	-	-	-	-	10		
30		Bonlie Slough	6	-	-	-	1	-		Gravel bottom severely disturbed site

Table 1. Continued

Set Number	Date	Area	Chum	Pink	Coho Smolt	Coho Fry	Dolly Varden	Stickleback	Other	Comments
31		Middle of Bonlie Slough	7	-	1	-	10	-		
32		Upper end of Bonlie Slough	28	-	-	-	-	-	1 staghorn sculpin 13 starry flounder	
33		Upper end of Bonlie Slough	1	-	-	-	2	-		
34		Rainy Creek upper intertidal	20	-	1	80	-	-		
Total sets = 65			872	-	812	275	188	1,823	1 Snake prickleback 5 Pacific herring 3 Capelin 1 Eulachon 123 Starry flounder 8 Staghorn Sculpin 1 Sockeye smolt	
1/	Coho smolt mean SF length = 90mm		Range = 76 - 104mm							
2/	Chum fry mean SF length = 40mm		Range = 38 - 44mm							
3/	Chum fry mean SF length = 39mm		Range = 37 - 41mm							
4/	Chum fry mean SF length = 44mm		Range = 39 - 53mm							
5/	Coho fry mean SF length = 36mm		Range = 34 - 39mm							
6/	Chum fry mean SF length = 40mm		Range = 37 - 42mm							

A total of 1,324 chum fry were examined for adipose fin clips and no marks were observed.

The total fyke net catch for this period included 79 juvenile chum salmon, 100 juvenile coho salmon (2 smolts, 98 fry) 128 stickelback, 15 starry flounder, and 22 staghorn sculpins (Table 2). In addition, dipnet sampling captured a total of 452 juvenile chum salmon, 3 juvenile pink salmon, and 27 juvenile coho salmon fry (Table 3).

Crab pot catches in the vicinity of the coal transfer station were minimal due to the number of pots used (two) and the apparent densities of crabs in the area during this sampling trip. Total catches for three days of fishing included 6 dungeness crab and 3 tanner crabs with all the dungeness exhibiting various degrees of coal dust accumulation while the tanner crabs did not show any signs of coal dust (Table 4 and Fig. 1).

Substrate type information gathered during beach seine sampling noted a high predominance of emergent vegetation with gravel/mud bottoms in the areas of highest concentrations for juvenile chum, juvenile coho salmon and stickelback. In addition, large concentrations of juvenile chum and coho salmon and stickelback were noted in muddy/gravel vegetated tidal flats with meandering stream channels where the abundance of food organisms (e.g. amphipods, etc.) was also noted to be highest. On the other hand, Dolly Varden, starry flounder, and other miscellaneous species concentrations were noted to be highest in the mainstem Bear and Salmon River channels typified by gravel bottoms and heavy turbulence (Table 1).

Conclusion

The rapid increase in development of the tidal flats associated with the Bear and Salmon Rivers has raised concern with both Canada and Alaska fisheries interests. The result of this short term study indicate a very high utilization of tidal flat areas on both the Bear and Salmon Rivers in areas typified by emergent vegetation and meandering stream channels. In addition, side sloughs and pot holes caused by receding tides were also found to be of prime importance to juvenile chum and coho salmon fry. The results of this research identify the following conclusions.

Table 2. Summary of Fyke net catches in the Salmon and Bear River intertidal zones, May 20-21, 1987.

Set Number	Date	Area	Chum	Pink	Coho Smolt	Coho Fry	Dolly Varden	Stickleback	Other	Comments
1	5-20-87	Upper Hyder Creek	44 ^{1/}	-	-	15	-	54	5 Starry flounder	100's of amphipods
2	5-20-87	Upper Hyder Creek	12	-	2	1	-	62		
3	5-21-87	Rainy Creek	23			82		8	10 Starry flounder 22 Staghorn sculpin	100's of amphipods
Totals			79		2	98		124	15 Starry flounder 22 Staghorn sculpin	

No adipose fin clipped chum fry were observed
^{1/} chum fry mean SF length = 39 mm Range = 36 - 40mm

Table 3. Summary of Dip net catches in the Salmon River intertidal zone, May 21, 1987.

Set Number	Date	Area	Chum	Pink	Coho Smolt	Coho Fry	Dolly Varden	Stickleback	Other	Comments
1		Upper Hyder Creek from town to fyke net dipnet samples at low tide	11	-	-	15	-	-		Dipnet
2		South of unauthorized log storage	24	-	-	1	-	-		Dipnet
3		Middle Salmon River tide flats	17	-	-	1	-	-		Dipnet
4		South of gravel removal and concrete site	400	3	-	10	-	-		Dipnet
Totals			452	3	-	27	-	-		

A total of 452 chum fry were examined for adipose fin clips and no marks were observed.

Table 4. Summary of the crab pot catches in the vicinity of the coal transfer site, upper Portland Canal May 19-21, 1987.

Pot Number	Date	Area Depth	Dungeness	Tanner	Comments
1	5-19-87	off Hyder Creek 40'-60'	1	-	Dungeness showed signs of coal dust contamination.
2			-	-	
1	5-20-87	North of small boat harbor	2	-	Both dungeness showed signs of coal dust contamination
2		40'-60'	-	-	
1	5-21-87	off small boat harbor 60'-100' deep	3	3	Dungeness all showed signes of coal dust contamination. Tanner all showed no signs of contamination.
2			-	-	
Totals			6	3	

1. All tidal flat areas consisting of emergent vegetation, sandy/muddy bottoms, and meandering channels should be protected from development activities. These areas appear to be prime rearing locations for both juvenile chum and coho salmon.
 2. Side channels and pothole areas on tidal flats and in flood planes should be protected from development that would impact these areas (e.g. log dumps, gravel and sand removal, etc.). Again, utilization of this type of area is very important to juvenile chum and coho salmon
 3. Additional research throughout the entire period of utilization by juvenile chum and coho salmon should be conducted to identify specific critical areas and rearing time periods.
 4. Additional and more intense work on the effects of the coal transfer site and the deposition of coal dust on benthic organisms (e.g. crabs) should be undertaken in the near future.
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Williams, G.L. 1986. Study of Habitat Restoration Opportunities in the Bear River estuaries. Prepared for Fisheries and Oceans Canada Habitat management Division, 1090 West Pender St. Vancouver B.C. 63 pp.